

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|-------|------|---|--------------------|------------------|---------|------------------|
| L1 | 1 | "04212236".pn. | JPO | OR | OFF | 2005/08/04 08:06 |
| L2 | 1 | "03295131".pn. | JPO | OR | OFF | 2005/08/04 08:07 |
| L3 | 1 | "05159696".pn. | JPO | OR | OFF | 2005/08/04 08:08 |
| L4 | 1 | "05198253".pn. | JPO | OR | OFF | 2005/08/04 08:08 |
| L5 | 1 | "11232997".pn. | JPO | OR | OFF | 2005/08/04 08:09 |
| L6 | 1 | "10289650".pn. | JPO | OR | OFF | 2005/08/04 08:09 |
| S1 | 671 | (445/50).CCLS. | USPAT; USOCR | OR | OFF | 2005/08/04 08:03 |
| S2 | 1 | ("6400091").PN. | USPAT; USOCR | OR | OFF | 2005/08/01 15:36 |
| S3 | 1 | "20020031972" | US-PGPUB; USPAT | OR | OFF | 2005/08/02 09:53 |
| S4 | 1 | "10799859" | US-PGPUB; USPAT | OR | OFF | 2005/08/02 09:53 |
| S5 | 1 | "20020009637" | US-PGPUB; USPAT | OR | OFF | 2005/08/02 13:44 |
| S6 | 1501 | (313/309).CCLS. | USPAT; USOCR | OR | OFF | 2005/08/03 08:57 |
| S7 | 1706 | (313/311).CCLS. | USPAT; USOCR | OR | OFF | 2005/08/03 08:57 |
| S8 | 1426 | (445/49-51).CCLS. | USPAT; USOCR | OR | OFF | 2005/08/03 08:57 |
| S9 | 3085 | (S6 S7 S8) | US-PGPUB; USPAT | OR | OFF | 2005/08/03 09:07 |
| S10 | 136 | S9 AND (nano\$tube) | US-PGPUB; USPAT | OR | OFF | 2005/08/03 09:08 |
| S11 | 153 | S9 AND (nano\$tube graphene nano\$particle nano\$filament nano\$rod nano\$whisker nano\$structure SWNT CWT MWNT (nano near3 (filament fiber fibre rod wire tube tubular structure particle))) | US-PGPUB; USPAT | OR | OFF | 2005/08/03 09:10 |
| S13 | 5 | ((("6624589") or ("6628053") or ("6626719") or ("6087765") or ("5872422")).PN. | USPAT; USOCR | OR | OFF | 2005/08/03 14:20 |
| S14 | 7 | "20020060516" "20020031972" "20020057045" "20020047513" "20030006684" "20030048055" "20030057860" | US-PGPUB; USPAT | OR | OFF | 2005/08/03 14:40 |
| S15 | 10 | ((("4728851") or ("4904895") or ("5986389") or ("6147449") or ("6171162") or ("6184610") or ("6231413") or ("6246168") or ("6288494") or ("5982091")).PN. | USPAT; USOCR | OR | OFF | 2005/08/03 14:47 |

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|-----|----|--|--------------------|----|-----|------------------|
| S16 | 7 | ((("5773921") or ("5973444") or ("5935639") or ("4956578") or ("5185554") or ("6448709") or ("6204597"))).PN. | USPAT; USOCR | OR | OFF | 2005/08/03 15:02 |
| S17 | 6 | ((("5577943") or ("5192240") or ("5214346") or ("5382867") or ("5612587") or ("6313572"))).PN. | USPAT; USOCR | OR | OFF | 2005/08/03 15:05 |
| S18 | 1 | "20020136896" | US-PGPUB; USPAT | OR | OFF | 2005/08/03 15:08 |
| S19 | 2 | ((("6135839") or ("6420726"))).PN. | USPAT; USOCR | OR | OFF | 2005/08/03 15:11 |
| S20 | 20 | ((("6472814") or ("5847495") or ("5066883") or ("6455021") or ("6471936") or ("6283812") or ("4816289") or ("5443859") or ("5618875") or ("5690997") or ("6129602") or ("6228904") or ("6333016") or ("6413487") or ("6445006") or ("5981305") or ("6290564") or ("5458784") or ("6331690") or ("5965267"))).PN. | USPAT; USOCR | OR | OFF | 2005/08/03 15:21 |
| S21 | 9 | ((("6390612") or ("5872541") or ("5543684") or ("5551903") or ("4900483") or ("5500200") or ("5726524") or ("5770918") or ("5185554"))).PN. | USPAT; USOCR | OR | OFF | 2005/08/03 15:27 |
| S22 | 1 | "20020009637" | US-PGPUB; USPAT | OR | OFF | 2005/08/03 15:27 |
| S23 | 1 | "20020047562" | US-PGPUB; USPAT | OR | OFF | 2005/08/03 15:31 |
| S24 | 1 | "20020146958" | US-PGPUB; USPAT | OR | OFF | 2005/08/03 15:31 |
| S25 | 1 | "20030048056" | US-PGPUB; USPAT | OR | OFF | 2005/08/03 15:30 |

PAT-NO: JP404212236A

DOCUMENT- JP 04212236 A
IDENTIFIER:

TITLE: ELECTRIC-FIELD ELECTRON EMITTING DEVICE AND
MANUFACTURE THEREOF

PUBN-DATE: August 3, 1992

INVENTOR-INFORMATION:

| NAME | COUNTRY |
|------------------|---------|
| KOMATSU, HIROSHI | |

INT-CL (IPC): H01J001/30 , H01J009/02

ABSTRACT:

PURPOSE: To reduce a threshold voltage by shortening the distance between a cathode electrode and a gate electrode and at the same time reducing the radius of curvature of the tip of a protrusion.

CONSTITUTION: In a structure with a gate electrode 24 disposed so as to overlap an emission protrusion 23 with an insulating layer 26 contained therebetween or in a structure with the gate electrode 24 disposed underneath the tip of the protrusion, the distance between the cathode electrode 22 and the gate electrode 24 is determined according to the film thickness of the insulating layer - the film thickness of the gate electrode). And the process of etching the cathode electrode thin film 22 excessively in a horizontal direction to sharpen the tip of the emission protrusion 23 is used.

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PAT-NO: JP403295131A
DOCUMENT-IDENTIFIER: JP **03295131** A
TITLE: ELECTRIC FIELD EMISSION ELEMENT AND MANUFACTURE THEREOF

PUBN-DATE: December 26, 1991

INVENTOR-INFORMATION:

| NAME | COUNTRY |
|------------------|---------|
| KOMATSU, HIROSHI | |

INT-CL (IPC): H01J001/30 , H01J009/02

ABSTRACT:

PURPOSE: To obtain a field emission element which can accurately control an emission electrode and a lead-out electrode at a distance of the order of submicron by forming a gate electrode in a self-matching manner with a cathode electrode at an electron emission protrusion of a flat substrate surface.

CONSTITUTION: A cathode electrode 3 works as an electron emission source, while a gate electrode 6 controls the amount of emission electron, and an anode electrode 5 accelerates and collects the emission electron. The wall surface of a board 2 that has at electron emission protrusion 4 of the cathode electrode 3 opposed to the anode electrode 5, is formed into a reverse-tapered shape, in particular, at the electron emission protrusion. The gate electrode 6 is notched in the same way as the electron emission protrusion 4 in the vicinity of the election emission protrusion 4. Since the gate electrode 6 is formed in a self- matching with the cathode electrode 3 at the electron emission protrusion 4 of the cathode electrode 3, lateral component of a distance dgk between the cathode electrode and the gate electrode is determined with good reproducibility. The component in a thickness direction of the dgk is determined by the thickness of an insulating this film which forms the board 2 and by the thickness of the gate electrode 6.

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PAT-NO: JP405159696A
DOCUMENT-IDENTIFIER: JP 05159696 A
TITLE: ELECTRIC FIELD EMISSION TYPE ELECTRON ELEMENT
PUBN-DATE: June 25, 1993

INVENTOR-INFORMATION:

| NAME | COUNTRY |
|-------------|---------|
| MARUO, YUJI | |

INT-CL (IPC): H01J001/30

US-CL-CURRENT: 313/340

ABSTRACT:

PURPOSE: To provide an electric field emitting type electron element suitable to high speed operation.

CONSTITUTION: On a high resistance monocrystalline silicon base 4 such as a non-dope Si (silicon) base, an anode electrode layer 3 of molybdenum metal is formed. Further, on the anode electrode layer, a cathode electrode layer 1 through an insulating layer 5 and a gate electrode layer 2 through an insulating layer 6 are provided, both layers being opposed to each other with a groove 7 between and mutually insulated. The insulating layers 5, 6 are formed of silicon dioxide, and the cathode electrode layer 1 and the gate electrode layer 2 are formed of molybdenum metal. The two layered part with the groove 7 between have saw-tooth shaped flat surfaces, and the top end part of the saw-tooth part of the cathode electrode layer 1 forms an electron emitting part. A plurality of linear array-like saw-tooth parts having a number of electron emitting parts are juxtaposed. The top end part 1a of the cathode electrode layer 1 is inclined and sharpened toward the direction of the gate electrode layer 2, and the sharpened top end part 1a is protruded from the insulating layer 5 in the direction of the groove 7. The top end part 2a of the gate electrode 2 is similarly protruded from the insulating layer 6 in the direction of the groove 7.

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PAT-NO: JP405198253A
DOCUMENT-IDENTIFIER: JP 05198253 A
TITLE: FIELD EMISSION TYPE ELECTRON SOURCE

PUBN-DATE: August 6, 1993

INVENTOR-INFORMATION:

| NAME | COUNTRY |
|----------------|---------|
| AKAGI, YUTAKA | |
| ISE, TOMOKAZU | |
| MARUO, YUJI | |
| URAYAMA, MASAO | |

INT-CL (IPC): H01J001/30 , H01J019/24

US-CL-CURRENT: 313/340

ABSTRACT:

PURPOSE: To provide a field emission type electron source stable physically, excellent in electrical and mechanical properties, and low in work function.

CONSTITUTION: A titanium layer 11a is formed on a silicon board electrode 10, and a titanitic carbide layer 11b is formed on the layer 11a with a carbon composition ratio kept increasing continuously upward. In addition, a titanium carbide layer 11c is formed on the layer 11b as an uppermost layer. Namely, a field emission type cold cathode 11 is constituted of layers 11a, 11b and 11c. The cathode 11 is manufactured, using a double source deposition method with a metal deposition source for titanium (Ti) and a metallic carbide deposition source for titanium carbide (TiC), and the composition ratio of metallic carbide is controlled by regulating the deposition rate of the deposition source.

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PAT-NO: JP411232997A
DOCUMENT-IDENTIFIER: JP 11232997 A
TITLE: ELECTRON-EMITTING DEVICE AND MANUFACTURE THEREOF
PUBN-DATE: August 27, 1999

INVENTOR-INFORMATION:

| NAME | COUNTRY |
|--------------|---------|
| YAMADA, JIRO | N/A |

INT-CL (IPC): H01J001/30 , H01J009/02

ABSTRACT:

PROBLEM TO BE SOLVED: To deflect emitted electrons in the predetermined direction and to discharge electrons with low drive voltage by protruding a first gate electrode into the inside of an aperture as against an emitter electrode.

SOLUTION: As a first gate electrode 13 is protruded inward to the inside of an aperture 7 as against an emitter electrode 15, a part of an electric field generated from an auxiliary electrode 11 is shut off by means of the first gate electrode 13. Therefore, electric fields generated from the first and second gate electrodes 13, 17 can be efficiently applied to the emitter electrode 15. Consequently, a desired electron discharge quantity can be attained by applying comparatively low drive voltage to the first and second gate electrodes 13, 17 without taking into consideration of the of an electric field applied from the auxiliary electrode 11. Electrons deflected so as to be concentrated on the substantially central part of the aperture 7 are accelerated and collide against a phosphor 5 formed on an anode electrode 3.

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PAT-NO: JP410289650A

**DOCUMENT-
IDENTIFIER:** JP **10289650** A

TITLE: FIELD ELECTRON EMISSION ELEMENT, MANUFACTURE THEREOF,
AND FIELD ELECTRON EMISSION TYPE DISPLAY DEVICE

PUBN-DATE: October 27, 1998

INVENTOR-INFORMATION:

| NAME | COUNTRY |
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|------|---------|

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| IWASE, YUICHI | |
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| OKITA, MASAMI | |
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INT-CL (IPC): H01J001/30 , H01J009/02 , H01J031/12

ABSTRACT:

PROBLEM TO BE SOLVED: To provide an field electron emission element which can control exactly the distance between the gate electrode and the electron emission part the cathode electrode with a simple structure.

SOLUTION: A cathode electrode 2 and a gate electrode 4 are laminated through an insulation layer 3, and the opening 7 of the gate electrode 4, the through hole 8 of the insulation layer 3, and the hole 9 of the cathode electrode 2 are formed continuously by etching. Electrons are emitted from an edge part roughly at right angles to the hole 9 of the cathode electrode 2 exposed by the side etching of the insulation layer 3. A second gate electrode 16 is formed under the cathode electrode 2 through an insulation layer 17 as necessary, thereby improving electron emission efficiency.

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